Journal of Research on the Lepidoptera 2 (4) :289-300, 1963

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THE *ANNAPHILA ASTROLOGA* COMPLEX
WITH DESCRIPTIONS OF THREE NEW SPECIES

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The species-complex presently known as *Annaphila astrologa* Barnes and McDunnough has had a long and confused history. This paper is an attempt to clarify the status of the several entities now bearing the name *A. astrologa* B. & McD.

The original type specimens to which Barnes and McDunnough (1918) applied the name *A. astrologa* were three females, from various non-specific locations in Arizona. When Rindge and Smith (1952) revised the whole genus *Annaphila, astrologa* was further described, including the picturing of the genitalia of the adult male and female, based on an extended series. While other species were treated in great detail, the authors noted that more specimen data in the species *astrologa* might alter their opinion.

This author discovered that it was possible to separate out from this long series of presumed *astrologa* several segrates all of which seemingly fit the description of *astrologa*. Two of these were collected together in various locations of Los Angeles, Orange and Riverside Counties of southern California. A third, unlike either of the two others, but related to those above, was collected in the Kern River basin of the Sierra Nevada Mountains.

Through the cooperative assistance of Lloyd Martin of the Los Angeles County Museum, E. A. Todd of the United States National Museum (USNM), Frederick Rindge of the American Museum of Natural History, and Jerry Powell of the University of California, Berkeley (UCB), the bulk of the material used in the Rindge-Smith study was reassembled and restudied with the intent of clarifying the status of these forms.

This work now being completed, the writer is led to the following conclusions: (1) that the original series used in the description of *astrologa* by Barnes and McDunnough included two species, (2) that the revision of Rindge and Smith (1952) failed to make this distinction, and working on this dual-as-one thesis, they placed two additional species under the name *astrologa*.

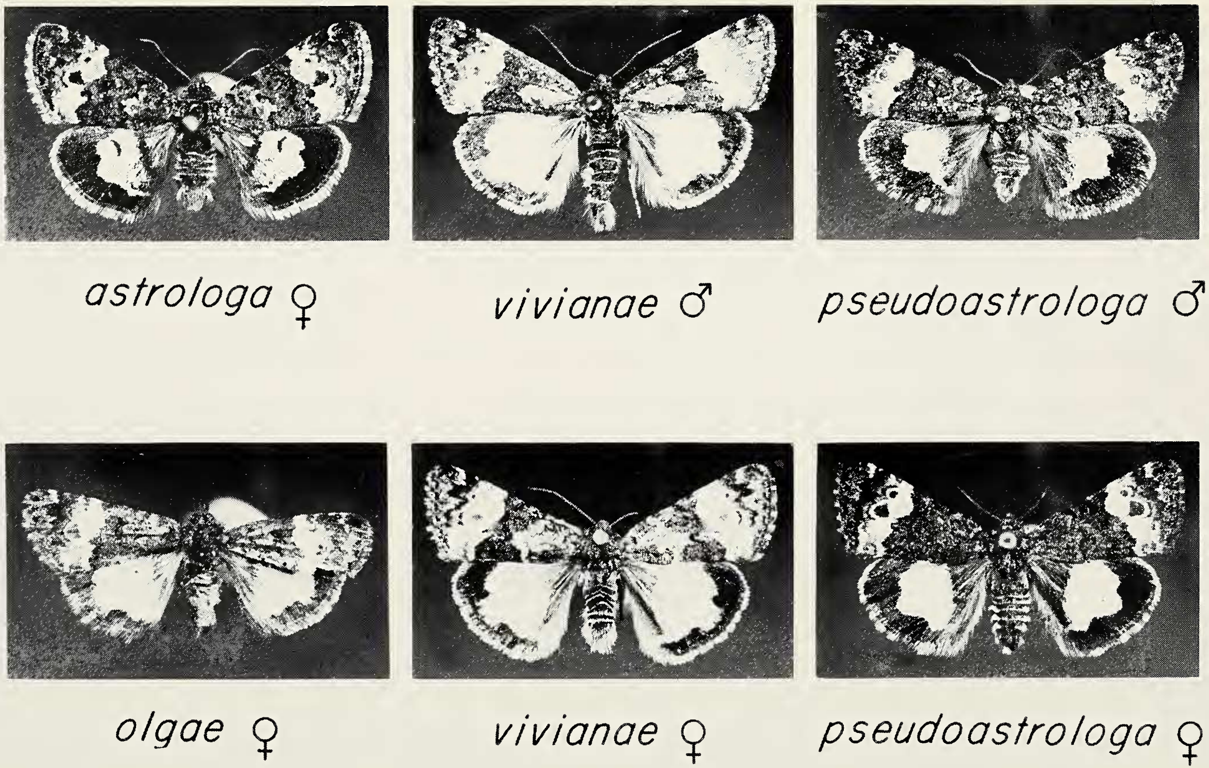

Fig. 1. Upperside facies of *Anaphila astrologa, A. vivianae, A. pseudoastrologa,* and *A. olgae* as indicated.

The initial task of the author was to establish which of the four species was to be called *astrologa*. In the original series of three specimens, two are con-specific, the third distinct, as noted above. One of the former had been used by Barnes and McDunnough (1918) to illustrate *astrologa*. In addition, con-specific material from California was used by Rindge and Smith to illustrate the male genitalia. Thus these two originals are designated the type series of *astrologa*, with the TYPE specimen so labled in the USNM collection. This example most closely agrees with the original description. The example illustrated in this paper (Fig. 1, 2) is from California, as are the specimens used in the drawings of the genitalia (Fig. 3, 4).

Annaphila astrologa B. & McD. (modified description) (fig. 1, 2, 3, 4).

Wing expanse: 17-20 mm. *Head - Vertex*: Black, few gray and whitish hair-like scales. *Front*: Black, with triangular tuft of long hair-like scales. *Antennae*: Black, with whitish scales at segment ends. *Palpi*: Mostly white. *Thorax*: Mostly black, few lighter scales (dorsal). Lighter ventrad, overlain with lighter hair-like scales of legs. *Abdomen - dorsal*: black, white rings at intersegmental area; *ventral*: same, with longer intersegmental hair-like scales giving a lighter aspect. *Wings - Fore wing upper*: Ground color black, with scattered lighter scales giving frosted aspect to base and sub-occipital areas. Basal area black, strongly frosted with light scales from base to basal line. Basal line whitish to basal dash, which is also whitish, indistinct. T. A. line white, "W" shaped, accented basally, distad at radius, and Cu area, mesad in medial and anal margin areas. Orbicular indistinct, oval, gray on black, often absent. Claviform absent. Median line broad, black, sub-parallel to T. A. line. Reniform outlined in white, kidney shaped, gray-cream in center. Connected to costa by white patch width of reniform, distad fusing with anterior end of T. P. line white, thin, penciled into a script "B" on distad end of Reniform, broader posteriad to anal margin. More clearly penciled than in *pseudoastrologa*. Area between T. P. line and S. T. line outlined in black, frosted with white scales. S. T. Line white, incomplete, broadest at apical end—faintest at Cu-2. Fringes black except at vein ends, which are white. *Hind wing upper*: ground color orange ventrally, bordered in black. Basal area 1/5 black, often overlain with long orange hairs, giving striated appearance. Discal spot usually present as lunule or spot (black). Outer 2/5 of wing is black band, broadest as rucurved hook in area of m-1. Fringes mostly white, black at tips of veins, often 1 mm dark band in area of anal veins. *Fore wing lower*: basal area to median line orange . Often a black area bordered by orange basally and distally. Median line black, well-marked, often spreading. Widest at costa. Reniform a black dash, often a black lunule. In field of orange, area between t. p. line and s. t. line a black band, broadest costad. Tip white. Fringes black, white at vein ends. *Hind wing lower*: basal area orange to t. a. line, t. a. line black, more an arc than above, occasionally incomplete. Discal spot black, lunule, central area orange to outer margin, outer margin as above. Fringes as above.

Type: Lectotype, female, Arizona (collector unknown), (no date), the specimen used is the one Barnes and McDunnough labeled "Type " and pictured in their publication in Contr.

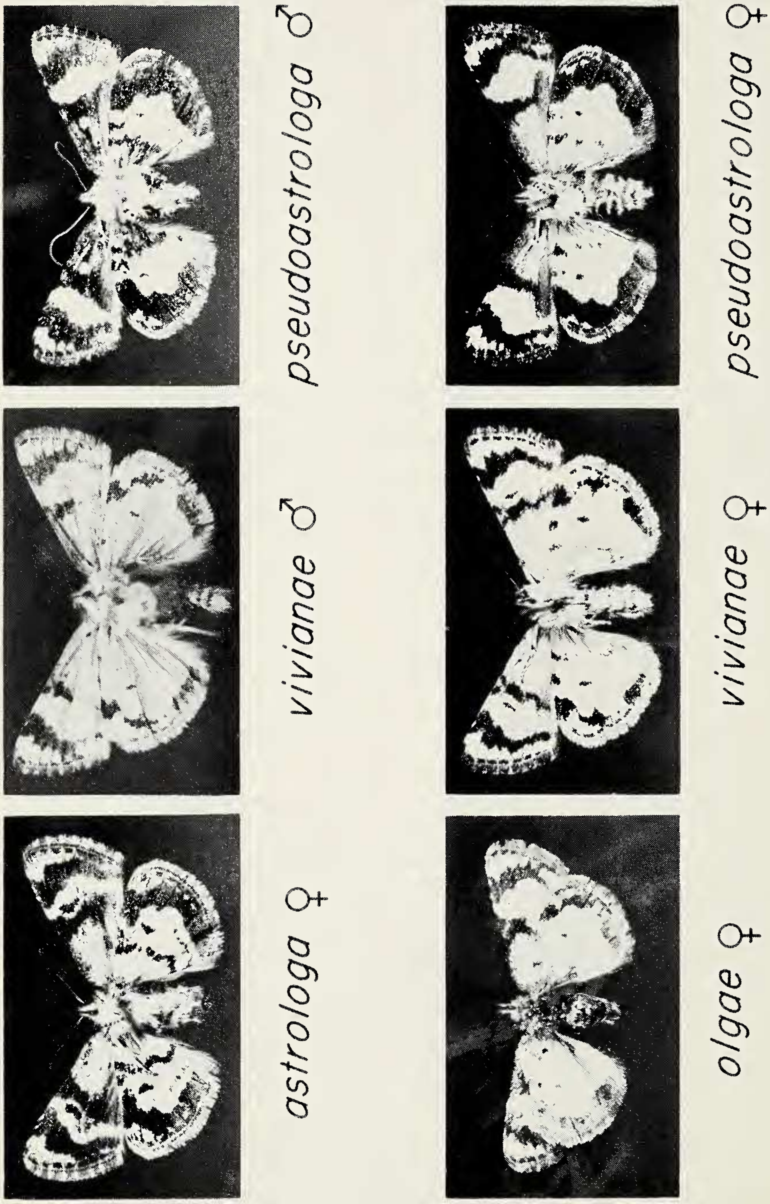

Fig. 2. Underside facies of *Anaphila* species as indicated.

Nat. Hist. Lepidoptera of N. America, Vol. 4, No. 2, Pl. 19, Fig 11. This is noted, as the B. & McD. series had as one of the three specimens the type of*Annaphila olgae,* sp. nov., as defined in this work.

Early stages: Will be discussed in a subsequent paper.

Foodplant: Emmenthalia penduliflora (Whispering Bells) California foodplant.

Type Locality: Reddington, Arizona.

Range: Southern Arizona; southern California, coastal to San Francisco, Mojave basin, west side. Not known from the Sierra Nevada range. This author believes that the California population, at least, is only on the wing in March and April. The flowering of growth cycle of the foodplant (dead in the summer months) precludes normal flight at the noted month of July.

Remarks: Rindge & Smith note that more material was needed to clarify exact relationship in this area. The male genitalia is noted as variable; in fact, it is very constant, the median spine in the valve serving as a differentiating character between *astrologa* and *pseudoastrologa.* It also appears that Rindge & Smith pictured the female genitalia of *pseudoastrologa* for *astrologa,* the differentiation here being the markedly stronger sclerotization of the ductus bursae of astrologa, and its larger size and elongated posterior cross section. With regard to maculation, *astrologa* is best separated by its more definitely penciled design, and presence of a black reniform spot on the underside of the fore wing. The latter is often present in *vivianae,* but the larger size and lighter total aspect of *vivianae* definitely separate these species; the conflict is likely to be with *pseudoastrologa,* with which it shares locality in California.

Male genitalia: Figure 3. *Valves*: symmetrical, complex, elongate, narrow, with costal projection, larger anal projection, tip curved, pointed (no ventro-medial projection, as in *pseudoastrologa*). *Tegumen*: elongate, tapering posteriad to base of uncus. *Uncus*: elongate, tapering posteriad, tip rounded. *Phallus*: (expanded). *Aedeagus*: sclerotized base 2 mm long, group of 12-15 secondary cornuti on ventral surface. *Vesica*: armed with several dozen primary cornuti longer than the secondary group, and separable into larger basal group (and more numerous filliform distal group).

Female genitalia: Figure 4. *Segment 8*: A transverse ring, most heavily sclerotized dorsally, less completely ventrad. *Ovipositor lobes*: subtriangular, scattered setae throughout. *Ductus bursae*: strongly sclerotized, more so than any of the other species of the complex, 1.5 mm long. Posterior end twice as wide as anterior end. *Corpus bursae*: 2 mm long, surface with numerous sub-equal small spines.

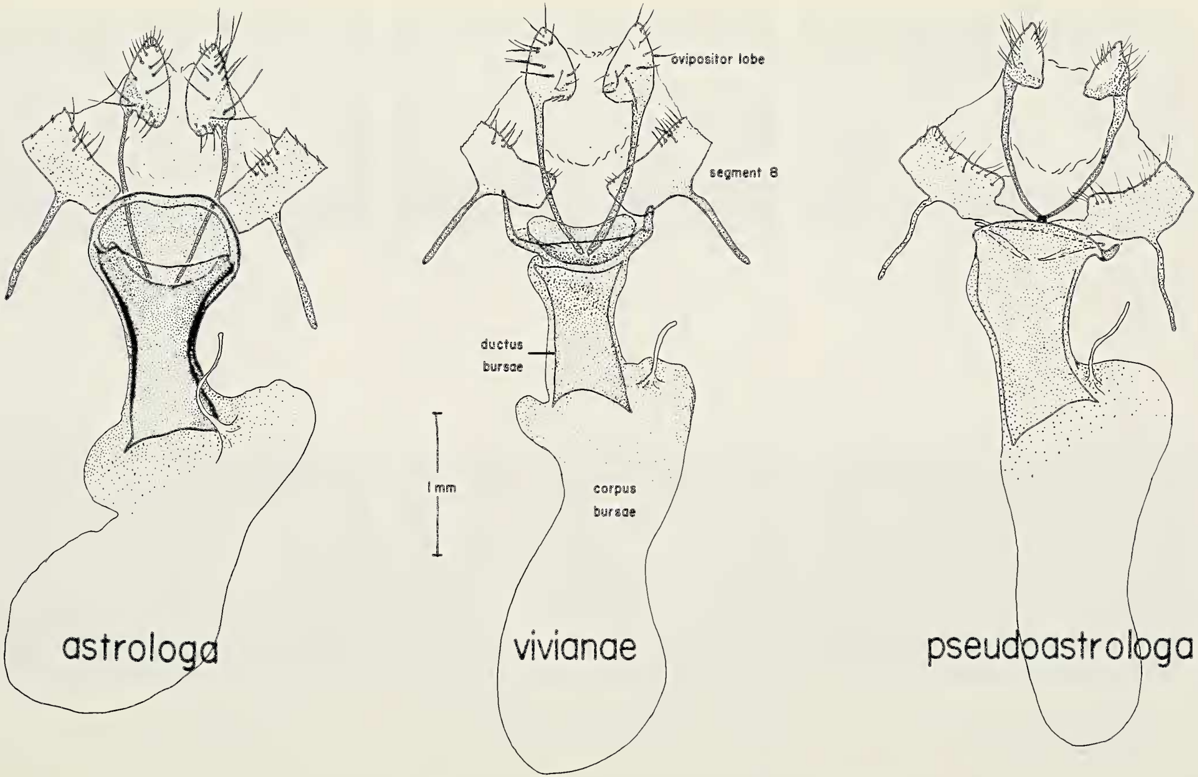

Fig. 3. Female genitalia of *Anaphila* species as indicated.

Annaphila olgae sp. nov. (fig. 3, 4).

The third specimen of the original B. & McD. series is unlike any other *Annaphila* known to this writer, and is here named *Annaphila olgae* sp. nov., in honor of my mother-in-law, Mrs. Olga Cornibe Presco, of South Pasadena, California. While the writer does not generally approve the naming of single specimens, it is felt that this particular case ought not to be left untreated. It does not appear to be a malformed individual, nor other than a representative example of its kind. Further, it is part of the original series of the basic species examined (Fig. 1, 2).

Male (unknown). *Female*: *Head* - *Vertex*: black, shaped as astrologa; *front*: black; *antennae*: missing; *palpi*: mostly white. *Thorax* - *Dorsal*: mostly rubbed in holotype, few scales left dark. *Ventral*: light tan, darker than any of the other species. *Abdomen* - *Dorsal*: a dark brown, under scope some lighter scales at segment boundaries; rubbed somewhat. *Ventral*: lighter than dorsum, but again darker in overall aspect than the others of the group. *Wing span*: 16.5 mm (as mounted). *Wings* - *Fore wing upper*: overall most like *pseudoastrologa,* but with ground color brown where *pseudoastrologa* is black. Only exceptions noted. *Basal area*: much rubbed, but under scope no evidence of light scales as in either *astrologa* or *vivianae*. *Reniform*: elliptical, rather than lunar, as in the others. *Hind wing upper*: most like *vivianae,* with basal band and basal area lighter even than *vivianae*. Brown again replaces black areas of other species. *Discal spot*: absent. *Distal band*: brown, least wide in m-cu area. *Fringes*: brown, white at vein ends. *Genitalia*: not known; type specimen not dissected.

Type: Fig. 1, 2. Holotype, female, Arizona (collector unknown) (not date). The third of the three specimens in the type of series of *astrologa,* as defined by Barnes and McDunnough. *Early stages*: unknown. *Foodplant*: unknown, but probably an annual in the family Hydrophyllaceae. *Type locality*: southern Arizona. *Range*: unknown. *Remarks*: this species is now known by the type alone. Since the specimen is one loaned by the USNM for this work, it has been returned. Kodachrome slides, with index to actual size, are available at the Los Angeles County Museum. It is believed that as the Tucson-Globe area is investigated with respect to the genus *Annaphila, olgae* may be taken in this area.

Annaphila pseudoastrologa sp. nov. (fig. 1, 2, 3, 4).

A third species, not part of the original series but included by Rindge and Smith, is here designated *Annaphila pseudoastrologa* sp. nov. Its California range is much the same as *astrologa* and its appearance very closely resembles that of *astrologa* B. & McD. It is of interest that in the areas where both occur together, examination of the foodplants growing in intimate contact may often yield the separate species, each from its chosen plant. The author has worked out the life cycles of both *astrologa* and *pseudoastrologa,* but these will be treated in detail in a subsequent paper.

Annaphila pseudoastrologa n. sp.

Wing expanse 19-24 mm. Male (& Female alike). *Head* - *Vertex*: black. Under scope few gray and orange-brown scales. *Front*: black, with triangular tuft of long, hair-like scales. *Antennae*: gross aspect black, with medial end of each segment black, distal and white, giving ringed appear-

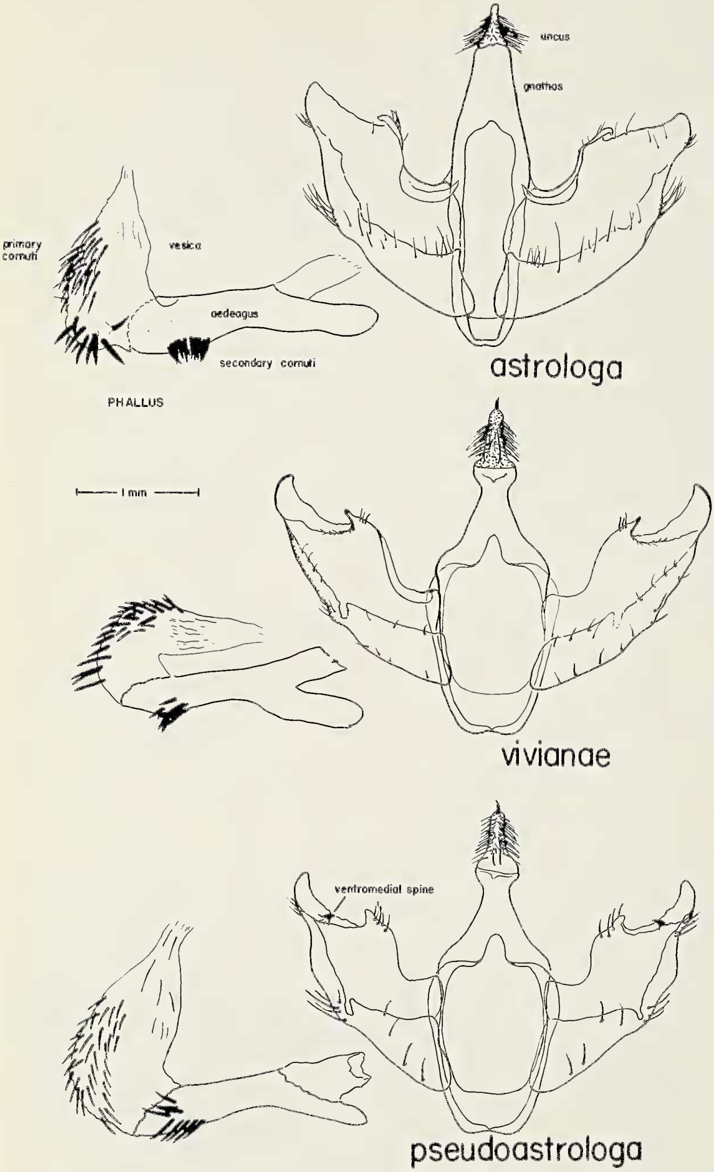

Fig. 4. Male genitalia of *Anaphila* species as indicated.

ance. *Palpi*: mostly white, with scattering of black, giving a light gray aspect, longer and lighter than *astrologa. Thorax - Dorsal*: black throughout. *Ventral*: white, especially so due to light hair-like scales on femurae. *Abdomen - Dorsal*: black cephalad, with white ring scales on caudal margin, these longer and more profuse than on *astrologa. Lateral*: transition between dorsum and ventrum. *Ventral:* caudal margin scales hair-like, overlying the anterior darker scales of next posterior segment, giving the whole surface a whitish aspect. *Legs* - Segments dark mesad, with distal light ring, scales hair-like. *Wings* - wing expanse 19-24 mm. *Upper surface fore-wing*: ground color gray-black. *Basal line*: black, extending from costa to posterior edge of radius. *T. A. line*: black, delineated by the grayish-black mesal area to basal line; zigzag distad on negative veins, mesad on positive veins. *Orbicular*: outlined in black, round, center often gray-black, causing whole area to be indistinct. *Claviform*: indistinct, often faintly outlined in black. *Median Line*: Indistinct to absent; always most prominent at anal margin. *Reinform*: White, suboval, lightly tinted gray central portion, always less so than *astrologa;* attached to costa by white patch terminating at t.p. line. *T.p. line*: white, blending to costal patch anteriad reniform; a light penciled line forming a script "B," touching reniform upper, central, and lower distal points; becomes broadened between cubitus and anal margin. *S.t. line*: at apex, a light dash; indistinct to absent posteriad r-2 vein. *Fringes*: black, often lighter at vein ends. *Upper surface hind wing*: *General pattern*: 1/3 area centrally orange, border black, costal, distal and anal margins more pronounced than basal margin. *Basal area*: scales hairlike, mostly black. *T.a. line*: indistinct, always the margin of bordering band, blending to ochrous center; always thinnest near end of a-1 vein. *Discal spot*: usually absent; when present a dot, rarely a fain dash. *Discal-anal border*: black, with outline of mesal edge distinctly less recurved than in *astrologa;* usually less wide than in *astrologa. Fringes*: mostly dark, white at vein ends; occasionally light anteriad m-1. *Lower Surface fore wing*: ground color orange; orange to medial line. *Median line*: black; variable as to width and degree of spreading mesad and distad into orange field; question mark-shaped, complete from costa to anal margin; some specimens show costal black dash marginal scales to median line. *Reniform* absent. *T.p. line*: black band, curved distad from costa to anal margin, broadest at costa: fused to distal margin between m-2 to cu-2 veins. *Tip*: white, edged in black. *Fringes*: black, white at vein ends. *Lower surface hind wing*: ground color concolorous ochre and black with fore wing. *T. a. line*: black, variable from complete to discontinuous line, often variably fused mesad into basal area. *Discal spot*: faint to absent in lighter specimens; a few black scales when present; always less than in *astrologa* and fainter than in *vivianae. Marginal band*: typical for all the complex; black, similar to *astrologa*, but never penciled as sharply as *in astrologa. Tip*: white-yellow twin patch of scales, edged in black. *Hind wing lower surface*: tip - fringes black and white, variable, mostly white near apex. *Holotype*: Male (Fig. 1) above Seminole Hot Springs, Coll. F. P. Sala, Santa Monica Mts., L. A. Co., Calif. March 9, 1957. *Allotype*: Female (Fig. 1) above Seminole Hot Springs, Coll. F. P. Sala, Santa Monica Mts., L. A. County, Calif. March 10, 1958. *Early Stage*: Will be discussed in a subsequent paper. *Foodplant*: *Phacelia parryi* Torr. and *P. minor* Harvy. *Type locality*: upper Latego Canyon, Santa Monica Mountains, Los Angeles (above Seminole Hot Springs) County, Calif. *Range*: southern California. The Santa Monica coastal mountain ranges. The intermediate ranges of the San Gabriels, the San Bernardino and Santa Rosa ranges, and into the desert ranges, wherever the annual foodplants, *Phacelia parryi* Torr. and *Phacelia minor* Harvy. The known northern limit thus far is southern Ventura County on the Pacific Coast, and the San Gabriels on the western margin of the Mojave. This is subject to change with further investigation. It does not appear to fly with *vivianae* in the southern edge of the Sierras, however. *Early Stages*: Life cycle will be detailed in a subsequent publication. On wing from late March through April, depending on location and altitude, and yearly climatic situation. *Remarks*: The holotype and allotype of *pseudoastrologa* have been deposited in the Los Angeles County Museum along with several paratypes. A pair of paratypes have also been placed in the collections of the USNM, Yale University, Cornell University, UCB, and the Neidhoefer collection, and the collection of William Bauer. *A. pseudoastrologa* is distinguished from all other species of this group by: *Gross aspect*: lack of white scaling on basal upper fore wing. Lack of median spot on hind wing upper and/or lower side; generally larger (20-23 mm wing span). *Genitalia* (male): median spine in ventromedial spine near apex of valve. *Genitalia* (female): incomplete segment 8, ductus bursae not so sclerotized as *astrologa*. *Genitalia*: male, Fig. 3, *Valves*: similar to *astrologa*, but with prominent ventromedial spine (fig. 4 "spine") near apex of valve. *Tegumen*: elongate, tapering, constricted anteriad uncus, broadened at tip. *Uncus*: broad at base, constricted to 1/2 basal width through posterior three quarters of length; tip pointed. *Phalus* (expanded): aedeagus similar to *astrologa*, secondary spines (cornuti) larger and fewer in number (6-8). *Vesica*: primary spines (cornuti) sub-equal throughout; long, filliform. *Genitalia* (female, fig. 4): *Segment 8* incomplete ring, less sclerotized throughout than in *astrologa*. *Ovipositor lobes* triangular, rounded at corners, half as wide at base as length. *Ductus bursae* well sclerotized, slightly tapering from maximum width at posterior opening, less than 1.5 mm long; sclerotization less than in *astrologa*. *Corpus bursae* gross aspect much like *astrologa*.

Annaphila vivianae sp. nov. (fig. 1, 2, 3, 4).

A fourth species from the Kern River basin of Kern County, California is yet again unlike any of those previously discussed, being the most spectacular of the group. This insect is here named *Annaphila vivianae* sp. nov., in honor of my wife, Mrs. Vivian P. Sala. Thus far, the known range of *vivianae* is restricted to Kern Canyon area of the Kern River. None of the other species of the *astrologa* complex has yet been taken from the southern tip of the Sierra foothill area. The life cycle of *vivianae* is also complete, and will be discussed later with the others.

Annaphila vivianae (original description)

Wing expanse 19-24 mm. Male and female alike. *Head - Vertex*: black, with liberal sprinkling of light scales. *Front*: black and white. *Antennae*: gross aspect black, medial end of segments ringed with white, under scope. *Thorax - Dorsal*: black and white, giving a dusty gray aspect gross. *Ventral*: white, more so than for any other members of this group. *Abdomen - Dorsal*: black, with white fringe covering inter-segmental area. *Ventral*: same, with longer fringe scales giving gross aspect a whiter tone. *Legs*: black-white banded. *Wings - Upper surface forewing*: ground color mostly white, black band across the orbicular area. White in basal area due to gross suffusion of basal area to T. A. line, and extensive widening of reniform and T. P. line. *Basal line*: white, extending from costa to medium. *T. A. line*: white, approximately .5 mm. wide, penciled finely in black mesad, extending from costa to anal margin. *Basal area*: white. *Orbicular*: indistinct to absent; when present outlined in light scales. *Claviform*: absent. *Reniform*: white, lunar, often without brown-gray lunule in center; strongly fused with white at costa. *T. P. line*: fused to reniform (white) at costa, "B" marking finely penciled, fused to reniform lower distal margin, fused out to S. T. line to anal margin. *S. T. line*: white, finely penciled to cu 1 fused to anal margin. *Area between T. P. line and S. T. line*: black. *Apex*: black, strongly overlain with white, frosted. Fringes: black, more strongly outlined in white at vein ends. *Hind wing upper surface*: pale orange, lighter than any other of the group; banded distally in black, mesally brown-black. Band broken at distal end basal margin. Orange area covering ¾ surface (more than any of other species). *Basal area*: basal band narrow, weak, long hairlike scales. *T. A. line*: faint, marks border of orange-yellow certer. *Discal spot*: usually absent, very faint dash on strongly marked specimen. *Distal band*: black, least wide in area from m-2 to cu-2. *Fringes*: white, occasionally few dark scales between veins, (lighter than any other species of the group). *Fore wing lower surface*: ground color orange. *Costa*: orange. *Median line*: represented by dark spot on costal margin, quadrate black spot in area of radial to medial veins. Area between T. P. line and S. T. line a black band from costa to cu-2. Tip white, veins delineated with darker scales. Fringes dark, white at vein ends. *Hind wing lower surface*: ground color orange. Discal spot faint, black. Outer margin band incomplete, starting at costal tip, broken at r-1 area, again at m-1 area to cu-1 continuing to inner margin. Apical tip white, veins darker, fringes white, darker at vein ends.

Male Genitalia: (Fig. 3) *Valves*: as per *astrologa*. *Gnathos*: as per *pseudoastrologa* (restricted caudad). *Uncus*: as per *pseudoastrologa*. *Phallus* (expanded): aedeagus sclerotized base 2 mm. lg. group of 6 to 8 secondary cornuti. *Vesica*: armed with several dozen primary cornuti subequal and strongly sclerotized. *Female Genitalia* (Fig. 4): *Segment 8*: incomplete ring. *Ovipositor lobes*: trangular, rounded, most nearly like *astrologa*. *Ductus bursae*: well sclerotized throughout, less than *astrologa* approx. 1 mm long, 0.6 mm. wide; less taper than either *astrologa* or *pseudoastrologa*. *Corpus burae*: like *astrologa* and *pseudoastrologa*.

Type holotype male: (Fig. 1, 2) Lower Kern Canyon, Kern County, California, March 12, 1956. Coll. Vivian Sala; deposited in Los Angeles County Museum collection. *Alotype female*: (Fig. 1, 2): Lower Kern Canyon, Kern County, California. March 2, 1960. Coll. F. P. Sala; deposited in Los Angeles County Museum collection. *Early stages*: Will be discussed in subsequent paper. *Foodplant*: *P. cicutaria*. *Type locality*: Kern Canyon, Kern County, California. *Range*: Southern tip of Sierra Nevada Mountains-Kern River drainage area canyons. The range may be extended to the north on the western slope of the Sierra, wherever *P. cicutaria* occurs in favored localities. Flight is restricted to a 3-4 week period usually beginning in the middle of March and completed by the second week in April, varying with the termination of winter rains.

Remarks:A. vivianae is one of the spectacular species. It is distinguished from all other *Annaphila* by the whitish suffusion over the normally black areas, and in the predominance of orange on the undersides of the wings. The known range is restricted (thus far) to the southern Sierra mountain range and *vivianae* does not with the other species of the *astrologa* group. In the Rindge-Smith material was-one specimen probably from the Havilah, Kern County, California area, probably a Henry Edwards specimen. *A. vivianae* may be the originating stock species. In habit and early stages, *viviane* is most like *pseudoastrologa*. With respect to sequencing of appearance of the *Annaphila* species of the Kern

Canyon area, it is an earlier flier than are either *astrologa* or *pseudoastrologa* are in their areas.

This species is named for my wonderful wife, Mrs. Vivian Presco Sala, who collected the holotype.

Evaluation of the several separating characters of the species lead me to believe that *A. vivianae* might be the forerunner of the group, *pseudoastrologa* and *olgae* being the most closely related, and *astrologa* possibly the latest derivative.

A. pseudoastrologa has the widest range in southern California following the range of its foodplants (*Phacelia parryi* Torr. and *P. minor* Harvy). It has been taken along the Pacific Coastal plain as high as 5,000 ft. in the coastal and intermediate ranges, and occasionally in the desert mountains of southern California and the Arizona types. *A. olgae* is known only from the type, and its data is only "So. Arizona, poling" (no date). It does carry a Poling label, and thus might be from the Tucson area of Arizona.

The rearing of the three species noted has thus far indicated a marked constancy of maculation and gross structure for each species. Thus, differences not in accord with these, and from ecologically separable areas as well, are suspect. Several specimens in the series evaluated as *astrologa* by Rindge and Smith from this southern California area do not fit any of the four species discussed in this paper. These have been separated from the *astrologa* series, and while the Rindge-Smith label has been left on the pin, it has been folded and noted as not agreeing with the descriptions listed. Two specimens so noted are from "western San Diego County, California." They are quite worn and indefinite as to collected location data. It was deemed inadvisable to use these as the basis for description of species. These will be held pending acquisition of additional material. One specimen from eastern San Diego is again different, being markedly more extensive in areas of black intruding on the orange areas. It most closely resembles *pseudoastrologa* and possibly is a race thereof. It has been set aside for future determination.

It is appropriate to discuss the California habitat of these species and some of the adaptations of *Annaphila* in general to this type of environment:

All *Annaphila* thus far reared by this writer (8 species) have indicated an annual life cycle and a pupal diapause, with no layover in the pupal stage beyond one year. Thus, in general, a species can be assumed to be restricted to those areas where the foodplant, an annual, is able to grow from seed each year.

It is the nature, in general, for the annual foodplants to be restricted to canyon slope areas, and to grow most profusely where the ground is often naturally disturbed (silt-flooding or slope slippage). These plants are clustered in chosen locations and found not at all elsewhere.

The various California mountain ranges, within which these foodplant locations are found, are strongly separated one from another ecologically. Add to this the local nature of the flight patterns of *Annaphila,* and the probability of transfer of the adults from one location to another is small indeed.

Degrees of isolation can be noted. The Sierra flora and accompanying *Annaphila* are strongly divergent from all the other coastal and intermediate southern California ranges. *A. vivianae* is not known to occur with any other of the *astrologa* complex species.

Further, the several coastal and intermediate ranges are now ecological islands as well. *A. astrologa* and *pseudoastrologa* fly together in the Santa Monica and the San Gabriel Mountain ranges, and thus these two are sympatric.

Acknowledgments

In addition to the aforementioned assistance in loaning of the materials used in this work, the assistance of Dr. Leland R. Brown, of the Department of Entomology of the University of California, and the Department of Entomology of the Los Angeles County Museum is gratefully noted.

Finally, the author is most grateful to Dr. Charles L. Hogue of the Los Angeles County Museum, who unselfishly assisted in the preparation of the illustrations and suggested the method for preparation of the genitalia.

Literature Cited

BARNES, W. and J. McDUNNOUGH. 1918. Original Description of *Annaphila astrologa. Cont. Nat. Hist. Lepid. No. America,* 4(2):

JEPSON, W. L. 1925. Manual of Flowering Plants. California School Book Depository.

RINDGE, F. H. and C. I. SMITH. 1952. A Review of the Genus *Annaphila* Grote (Lepidoptera, Philadelphia). *Bull. Amer. Mus. Nat. Hist.* 98(3):191-256.